

REMARKS/ARGUMENTS

Applicant thanks the Examiner for the Office Action dated March 22, 2007. In response to the issues raised, we offer the following submissions and amendments. Also enclosed is a Terminal Disclaimer linking the term and ownership of any patent granted in the present application to that of US 6,755,509.

Amendments

The claims have been amended to highlight the features distinguishing the present invention from the cited art. In particular, claims 1, 17 and 33 define that the heater has a generally planar configuration and that the plane of the heater is parallel to that of the nozzle. This is clearly disclosed in all the embodiments shown in the figures.

Accordingly, the amendments do not add any new matter.

Specification

At Page 1, the Applicant has inserted a paragraph entitled “Cross-Reference to Related Applications”, as required (just above “Field of the Invention). The Applicant submits that this amendment introduces no new matter.

Claims – 35USC§102

Claims 1, 3, 5, 7, 9, 16-19, 21, 23, 25, 31-36, 38, 40 and 47 stand rejected for lack of novelty in light of US 5,706,041 to Kubby et al.

Independent claims 1, 17 and 33 have been amended to incorporate the specific configuration of the suspended beam heater and the corresponding nozzle. The generally planar heater element beam generates a broad, relatively flat bubble. The pressure pulse this creates in the ink is similarly broad and propagates through the chamber generally normal to the nozzle aperture. This provides efficient drop ejection and better drop directionality.

This configuration is not taught by Kubby and hence it fails to anticipate independent claims 1, 17 or 33. It follows that dependent claims 3, 5, 7, 9, 16, 18, 19, 21, 23, 25, 31-36, 38, 40 and 47 are also novel.

Claims – 35USC§103

Claims 4, 6, 10-12, 20, 22, 26-28, 37 and 41-43 are rejected as obvious in light of Kubby, in view of US 6,019,457 to Silverbrook.

As discussed above, Kubby does not teach a suspended beam heater positioned in a plane that is parallel to the plane of the nozzle aperture. While Silverbrook describes a planar heater that is parallel to the nozzle aperture, the heater is not suspended. The bubble generated is restricted to the periphery of the ink chamber. The pressure pulse generated by the bubble does not propagate in the direction of drop ejection. Hence the ejection is less efficient. This requires more energy input for bubble generation which in turn generates more heat in the substrate (as the heater is not suspended). Excess heat dissipation to the substrate can result in boiling the ink.

Combining the suspended heater of Kubby with Silverbrook is not obvious as Kubby ejects ink from the side of the substrate, or in other words, parallel to the plane of deposition. Fabricating a so called ‘roof shooter’ printhead, (i.e. ejects normal to the plane of deposition) is a fundamentally different design. Suspending the heater in a roof shooter requires the heater to be temporarily supported on a scaffold structure while the rest of the nozzle is deposited. The scaffold must then be removed along with the chamber roof scaffold without damage to the heater. These are not trivial issues and there is no teaching as to how they may be addressed in either of the citations.

Accordingly, there is not motivation for the skilled worker to combine Kubby and Silverbrook to yield the present invention.

Claims 8, 24 and 39 are rejected as obvious in light of Kubby, in view of US 6,543,879 to Feinn et al.

Kubby does not teach a suspended beam heater positioned in a plane that is parallel to the plane of the nozzle aperture. Feinn is also silent as to this feature. As claims 8, 24, and 39 are each appended to amended claims 1, 17 and 33 respectively, the cited documents fail to teach all the elements of the invention.

Accordingly, the citations do not support a §103 rejection of these claims.

Claims 13, 29 and 44 are rejected as obvious in light of Kubby, in view of US 4,965,594 to Komuro.

Kubby does not teach a suspended beam heater positioned in a plane that is parallel to the plane of the nozzle aperture. Komuro is also silent as to this feature. As claims 13, 29, and 44 are each appended to amended claims 1, 17 and 33 respectively, the cited documents fail to teach all the elements of the invention.

Accordingly, the citations do not support a §103 rejection of these claims.

Claims 15, 31 and 46 are rejected as obvious in light of Kubby, in view of US 5,969,005 to Yamashita et al.

Kubby does not teach a suspended beam heater positioned in a plane that is parallel to the plane of the nozzle aperture. Yamashita is also silent as to this feature. As claims 15, 31 and 46 are each appended to amended claims 1, 17 and 33 respectively, the cited documents fail to teach all the elements of the invention.

Accordingly, the citations do not support a §103 rejection of these claims.

Non-Statutory Double Patenting

The enclosed Terminal Disclaimer prevents any unjustified extension of exclusive rights or harassment from multiple assignees.

It is respectfully submitted that the Examiner's rejections have been successfully traversed and the application is now in condition for allowance. Accordingly, favorable reconsideration is courteously solicited.

Very respectfully,

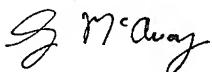
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